



The
Imperial Forestry Institute
University of Oxford

THIRTY-FIRST ANNUAL REPORT

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Introduction. In October, 1955, the School of Forestry will celebrate its fiftieth anniversary, having been brought to Oxford by Dr. Schlich from the Royal Indian Engineering College at Coopers Hill in 1905. Preliminary steps were taken to organize an appropriate programme and to invite contributions by past and present members of the School for the purpose of commemorating the occasion. It was proposed to establish an annual prize to be awarded to the most meritorious undergraduate completing his studies for the Forestry Degree.

During the year under review the Forest Herbarium, under the direction of Mr. A. C. Hoyle, was transferred back to the Department of Forestry from the Department of Botany, to which it was transferred in 1938 when the old School of Forestry and the Imperial Forestry Institute were merged. The Forest Herbarium continues, however, to be housed in the Department of Botany.

Students. The number attending courses throughout the year was fifty-eight.

Fourteen students were successful in the examination for the Forestry Degree, the classes obtained being three Seconds, ten Thirds and one Fourth. Of these, two were Colonial Forest Probationers who returned to their Colonies, two obtained posts with the Colonial Forestry Service, one in Nyasaland and one in Tanganyika Territory, one returned to Pakistan to join the Forest Service there, a South African obtained a post with the Northern Rhodesia Forest Department, and another South African is spending some time in Canada before returning to South Africa. A Government Scholar from Kenya returned to that Colony to join its Forest Department; another Government Scholar, a Jamaican, returned to Jamaica to join the Forest Service there; one graduate joined an Oxford University Expedition to Borneo, as Botanist, and four undertook their National Service.

There were twenty students in the junior year.

The Forest Officers' course was attended by twelve officers of the Colonial Forest Service. They came from Malaya (3), Northern Rhodesia (2), Nigeria (2), Tanganyika (1), Uganda (1), Fiji (1),

Sarawak (1), and British Guiana (1). A Forest Officer from Ceylon attended a special course.

Again this year, only one Indian Forest Officer (from Bihar) and one Pakistani Forest Officer (from Punjab) attended the course arranged for them.

Research Students. One student submitted a thesis for the D.Phil. Degree, entitled 'The influence of the shoot system on the root growth of (certain forest tree) seedlings.' This has been approved after the end of the period under report. Three students successfully submitted theses for the Diploma in Forestry. Their subjects were 'A study of the silvicultural effects of successive coniferous crops under European conditions and their bearing on *Pinus radiata* plantations in South Australia', 'Studies on the mineral nutrition of Scots pine in relation to growth', and 'An investigation of the Forest Soils of the islands of some Scottish lochs'.

Other Students. During the year a British Council Scholar from Ecuador took the Forest Officers' course, and attended as many of the tours arranged for both Forest Officers and students as possible. During Michaelmas Term, Forest Officers from Germany, Turkey, and South Africa also attended courses in the Institute.

Prizes. The Schlich Memorial Prize was awarded this year to T. G. Allen, Assistant Conservator of Forests, Fiji.

Instructional Tours (1) The Introductory Tour in Britain, for students about to start their forestry course and for those from overseas unfamiliar with British forests and forestry, was made just before Michaelmas Term. The tour was conducted by Mr. T. E. Edwardson and Mr. F. C. Osmaston, the Professor and Colonel Lloyd joining them for part of the time. Forests visited included the State Forests of the Dean, Tintern, Crumblands and Crychan, and the estate of Major H. T. H. Foley at Stoke Edith, near Hereford.

(2) *Western France.* Nineteen students and a British Council Scholar from Ecuador visited the forests of Normandy and the Landes in March-April. The tour was conducted by Mr. Edwardson and Mr. Osmaston.

(3) *Eastern France and Switzerland.* The fourteen senior students together with four Forest Officers from Ceylon, Ecuador, India, and Pakistan visited forests in the Vosges and Jura during the Easter Vacation. The tour was conducted by Dr. Jones.

(4) *Postgraduate Tour in Great Britain.* Twelve Forest Officers, a British Council Scholar from Ecuador and two Nigerian undergraduates made a six-day tour in S.W. England under the leadership of the Professor and Mr. Edwardson. They visited well-known private estate woodlands at Fonthill Abbey, Crichel, Dartington Woods, Moretonhampstead and Maiden Bradley, a National Trust area (Killerton Woods) and Forestry Commission areas at Collingbourne, Gardiner and Wareham Forests, and Quantock Forest.

Thanks are tendered to all estate owners and agents and to members of the Forestry Commission staffs who permitted the students to visit their woods and helped organise the tours.

(5) *Holland*. Twelve Forest Officers, together with three Forest Officers from India, Pakistan and Ceylon visited Holland immediately after the end of Trinity Term. Arrangments were made with the help of the Director of the Netherlands Forest Service, Mr. F. W. Malsch and his assistant, Mr. W. L. Jansen, to whom thanks are given. Areas visited included the poplar district near Best, Boxtel and St. Oedenrode, a visit to the Forest Experiment Station at Wageningen and the Drenthe State Forests. They also saw the construction of dykes for the new Zuyderzeepolder. The tour was conducted by Dr. Dimbleby and Mr. Gordon.

Additional Courses and Tours. Two short courses were arranged for Forest Officers on leave this year. The first, on Forestry Costings, was organized by Mr. J. J. MacGregor and took place from 14th-22nd June. Eight Officers attended, from Northern Rhodesia (2), Nyasaland (1), Nigeria (2), Somaliland (1), Cyprus (1), and Australia (1). The course opened with an introductory lecture from the Professor and a lecture from Mr. MacGregor on the history of forestry costing in Britain and the work of his section in developing the Survey of Private Forestry Costs. A demonstration was given by Mr. Balman. A tour included visits to the counting offices of the following private estates: Dartington Hall, Woodlands Section; Stourhead Estate; Longleat Estate; and the Forestry Commission Office at Savernake Forest. The course terminated with attendance at a conference in the Department between the Officers and owners and agents co-operating in the Survey of Private Forestry Costs.

The second course, on Forest Management, took place between June 23rd and July 26th, and was attended by eighteen Forest Officers, from United Kingdom (2), Canada (2), Australia (1), Southern Rhodesia (1), Northern Rhodesia (2), Nigeria (2), British Honduras (1), Tanganyika (3), Gold Coast (1), Somaliland (1), Cyprus (1) and India (1). The course began with a week of lectures at Oxford given by the Professor and members of staff and by Mr. G. B. Ryle and Major-General Hutson of the Forestry Commission. It was followed by a week's tour in the United Kingdom where Forestry Commission areas at Talybont, Crychan, the Dean, and Thetford Chase were visited. Private estates at Stoke Edith, Eastnor and Weasenham were also visited. The party under the leadership of the Professor and Mr. Brasnett left for the Continent on July 7th. A week was spent at Nancy, visiting forests in that neighbourhood, followed by a week in Switzerland, where a tour had been organized by the Swiss Federal Institute of Technology, Forestry Department (Professor Dr. A. Kurth). Finally a week was spent in W. Germany, where a coach had been chartered to take the party from Singen through the Black Forest to Hamburg, via Rohrbrunn, Spessart, Frankfurt, Hann.-Münden, and Syke. Thanks are due to the many Continental foresters, too numerous to name individually, who helped organize the tour and conducted the party at various points.

Course in Forestry for the British Council. The Director, Courses Department, British Council, has asked the Institute to organize a

short course for Forest Officers from the Continent and other foreign countries in collaboration with the Forestry Commission, towards the end of September and the beginning of October. Arrangements are being made for this.

Working Plans. The practical work was again carried out in the New Forest from the Forestry Commission hostel, Northerwood House, under the supervision of Mr. Brasnett and Mr. Osmaston, helped by Mr. Edwardson and Dr. Jones.

Utilisation Course. Final-year students attended a short course of demonstrations at the Forest Products Research Laboratory at Princes Risborough, and two visits were arranged for the Forest Officers to discuss their individual problems with members of the staff there. Special thanks are due to the Director and those members of his staff who gave demonstrations, etc.

Vacation Practical Work. Undergraduate students are expected to carry out some practical work in the forests during Long Vacations. Five students found employment in Norway through the kindness of Mr. Ihlen of the Norske Skogselskap and three worked with the Ontario Forest Department, arrangements being made by Mr. A. P. Leslie of the Department of Lands and Forests, Ontario. Other first-year students worked in Forestry Commission woods and private estates in the United Kingdom. We are greatly indebted to all those who have helped to provide these opportunities of practical experience which is a most valuable complement to studies in the School.

Excursions. During Trinity Term the Forest Officers made excursions to Alice Holt Research Station (Forestry Commission), the Directorate of Colonial Surveys (Tolworth), Cirencester Estate, the property of Earl Bathurst, the timber yards of Messrs. William Mallinson & Sons Ltd., London, and the furniture factory and timber seasoning yard of Messrs. E. Gomme Ltd. of High Wycombe. The senior year students visited Cirencester Estate, Windsor Great Park, Alice Holt Woodlands and Hazelborough Woods; also Plumbridge Sawmills, High Wycombe, to see some timber conversion and seasoning.

The junior year students visited local woods for field study of silviculture and soils with Dr. Jones. Wytham Wood has again proved useful for demonstration purposes.

Thanks are tendered to all who permitted students to visit their woods and works.

Discussions. During Michaelmas and Hilary Terms, fourteen open discussions of forestry topics of general interest for Colonial Forest Officers were organized. Officers took it in turns to lead the discussions. During Trinity Term, short papers in selected topics (usually the Forest Officer's 'Advanced Study') were read by the same group, each paper being followed by questions and discussion.

Seminars on Regeneration of Tropical Forests. Three seminars on this subject were arranged during Hilary Term, this method being considered preferable to lectures.

Visiting Lecturers. The usual series of invited lectures in Hilary and Trinity Terms were given with a different lecturer each week. These lectures are primarily for the post-graduate class, dealing mainly with problems not usually covered by the staff of the Department. The lectures were followed by questions and discussions.

The subjects dealt with :

- (1) *Arboricides.* Professor G. E. Blackman.
- (2) *The economic aspects of mechanisation for forestry in the tropics.* Mr. G. W. Houlding and Mr. Muir-Wright of the United Africa Co.
- (3) *The ecology of savannah woodlands.* Mr. R. W. J. Keay, Colonial Forest Service (Nigeria).
- (4) *The use of hardwoods in pulp and fibre board industry in the tropics.* Mr. J. D. Roach, of the Bowater Paper Corporation Ltd.
- (5) *Tropical Climates.* Dr. R. P. Beckinsale, University Department of Geography.
- (6) *Wild-life management in forests and reserves.* Dr. F. Fraser Darling, F.R.S.E., Nature Conservancy.
- (7) *Marketing of colonial timbers.* Mr. J. D. Braithwaite, of Messrs Mallinson & Sons Ltd.
- (8) *Reproductive systems and plant breeding.* Mr. E. A. Bevan, University Department of Botany.
- (9) *Forest tree breeding.* Mr. J. D. Matthews, Geneticist, Forestry Commission.
- (10) *Land use problems as affecting Forestry.* Professor L. Dudley Stamp, C.B.E., London School of Economics.
- (11) *Forest Roads.* Major-General H. P. W. Hutson, C.B., D.S.O., O.B.E., M.C., Chief engineer, Forestry Commission.
- (12) *The ecology of tropical rain forest.* Professor P. W. Richards, University of North Wales.
- (13) *Primitive man in relation to the forest.* Professor F. E. Zeuner, F.G.S., F.Z.S., Institute of Archæology, University of London.
- (14) *The forestry work of F.A.O.* Dr. Egon Glesinger, Deputy Director, Food and Agriculture Organization of the United Nations.

Assistance from other Departments, etc. Special courses in surveying and soil science were given by members of these two departments to the Forestry students. Mr. Hammersley, Assistant to the Reader in the Design and Analysis of Scientific Experiment and Mr. G. B. Masfield, the University Lecturer in Colonial Agriculture, also gave courses to the senior-year and postgraduate students. The Reader in Animal Ecology (Mr. Elton) demonstrated the work being carried out by the Bureau of Animal Population during Hilary Term. The thanks of the Department are extended to all lecturers concerned and the Heads of their Departments.

Immediately before the beginning of Michaelmas Term, the staff of the Commonwealth Forestry Bureau gave two short introductory

courses on Documentation to members of the Colonial Forest Officers' course.

Assistance given to other Departments, etc. The Professor again lectured on Colonial Forestry to the Colonial Administrative cadets at both Oxford and Cambridge, and to the Colonial Agricultural Service Officers at the latter University.

Staff Tours. Before attending the IVth World Forestry Congress in India, the Professor visited Cyprus in order to see forestry conditions there, and afterwards spent some time in Malaya (with the Colonial Forest Adviser), Sarawak and Borneo. He was away about two months.

At the request of the Colonial Office, Dr. Jones is undertaking an extensive tour of Africa, covering parts of Uganda, Kenya, Tanganyika, Nyasaland, Belgian Congo and Nigeria to advise on the organization of research on *Chlorophora excelsa*. He expects to be away for the whole of Long Vacation.

Research Field Station. The Yorkshire station at Wykeham has again been used by members of the research staff. Acknowledgment is made of the help that continues to be given by the Silviculturist (North) of the Forestry Commission and by their Research Forester, Mr. Weatherell.

Scientific Societies, etc. Members of the staff have been active on the Councils and Committees of various societies, as in previous years.

Government Committees. The Professor and Mr. N. V. Brasnett continued to serve on the Committee on Forestry of the Colonial Advisory Council of Agriculture, Animal Health and Forestry.

Senior Staff. The most noteworthy change in the staff has been the retirement in April of Mr. N. V. Brasnett, Lecturer in Forest Management and Colonial Forestry. He joined the Institute in 1945, on his retirement from the Colonial Forest Service, in a temporary appointment that has been repeatedly renewed. The Institute's indebtedness to him is recorded for ten years' most valuable work and for his constant readiness to give assistance wherever it was needed. He was succeeded in the post for Colonial Forestry by Mr. W. A. Gordon, who was until recently Conservator of Forests, British Guiana, but has also served in Cyprus and visited the West African Coast. Mr. F. C. Osmaston joined the staff on September 1st, taking over from Mr. Brasnett as Lecturer in Forest Management. He was for many years a member of the Indian Forest Service and on his retirement joined the staff of the Edinburgh Forest Department in 1947.

Technical Staff. Two additional technical assistants have been appointed for the eight laboratories. The Photographer's and Artist's sections continue to be staffed by three technicians, and the Workshops by three.

Secretarial Staff. There has been no significant change in the secretarial staff during the year.

WYTHAM WOODS

The restoration of these woods to full useful production has continued satisfactorily. Some 10.5 acres of open and scrub forest were felled and planted with beech, oak, and ash with conifer nurses and 1.0 acre regenerated naturally. Widespread death of rabbits from myxomatosis has, at least temporarily, made fencing unnecessary. The earlier plantations, now some nine years old, will receive their first thinning next winter to relieve some oak from their larch nurses. The previous five-year thinning scheme having expired, a new one has been prepared so that new plantations will be thinned on a three-year cycle and older stands on a five-year cycle. With the growth of the new plantations, thinning will soon become the major operation in place of planting and, as areas are thinned for a second time, improvement of the woods is becoming apparent.

Due to a combination of shooting, a wet summer and hard winter, the incidence of squirrels is markedly less. This decline in both the rabbit and squirrel population is reflected by a welcome reduction in the previous almost catastrophic barking of sycamore and ash poles.

The technique of pulling a roller behind a tractor has continued to prove effective both in crushing and weakening heavy growth of bracken and other weeds before planting and in keeping the ground protected from frost.

Sales of timber and poles were fairly satisfactory and none remained unsold at the end of the year. Some four acres of coppice due to be cleared in the High Forest Working Circle were sold standing. Next year it is hoped to sell a coupe standing in the Coppice Working Circle where lack of demand has prevented any felling in the last five years.

BAGLEY WOOD

The working plan for Bagley Wood was submitted under the Dedication Scheme to the Forestry Commission. Planting and tending operations carried out in the year were as prescribed, but thinning, owing to the labour position, fell a little behind. Storing of the coppice, as prescribed, still remains to be done. Two houses in Bagley Wood for workmen were nearly completed by the end of the year. Myxomatosis appears to have cleared the area of rabbits, but wiring of plantations will be continued for at least another year.

SILVICULTURE

Dr. E. W. Jones gave the usual courses of lectures on silviculture and forest ecology to the first- and second-year students, with practical classes in Bagley and Wytham Woods. He also gave lectures on plant ecology to the Forest Officers and demonstrated nursery technique.

Mr. Edwardson conducted the tour for first-year students in Normandy and the Landes, whilst Dr. Jones, after a short study

tour in Belgium, took the tour for second-year students in the French and Swiss Jura. Dr. Jones also accompanied for ten days the working plan course in the New Forest.

During the Easter Vacation the re-charting of the Lady Park Ecological Reserve in the High Meadow Woods, Forest of Dean, was begun. The permanent transects were last examined five and six years ago. In July, Dr. Jones began an extensive tour in Africa on behalf of the Colonial Office to study the silviculture of *Chlorophora excelsa*.

ECOLOGY

The start of the current year's work was overshadowed by the meeting of the British Association in Oxford; as Local Secretary for the Forestry Section, Dr. Dimbleby was deeply involved in the meeting. Of particular interest to forest ecologists was the session dealing with the theme 'Tree Growth on Acid Soil', a full report of which appeared in *Nature* (Vol. 174: 855; 1954). The work carried out in this Institute featured prominently in this session.

Field work has been extensive during the year and has largely been directed to the location of further sites suitable for studying the effect of species on soil development. So many requirements must be satisfied before fair comparisons can be made that the selection of sites is a matter of great difficulty. In fact, it cannot be said that fully suitable sites have yet been found in Southern England.

At the invitation of the Queen's University, Belfast, a short but valuable visit to Northern Ireland was made to study soil development as revealed by work being carried out jointly by archaeologists and by the Quaternary Research Group which has recently started work there. The relationship between early agriculture, podzolization and subsequent peat formation was the subject of particular investigation, the laboratory work connected with which is not yet completed.

Dr. Dimbleby accompanied the Forest Officers on their tour in Holland (reported elsewhere) and found this a useful opportunity for comparing techniques and results of heathland afforestation in Holland with those in Britain.

The course in ecology for postgraduate students was again given by Dr. Dimbleby.

TREE PHYSIOLOGY

Courses of lectures were given by Dr. Leyton; field classes (soil and vegetation studies) were also held.

Experimental work, concerned mainly with mineral nutrient relations and root growth, continued both in the field and in the laboratory. An investigation on Japanese larch growing on Hackness Moor has shown that height growth can be quantitatively related to the concentration of certain mineral nutrients in the needles by means of a multiple regression analysis; similar relationships have

been obtained by K. A. Armson (Diploma candidate) in Scots pine from Bramshill Forest. Attention has been directed to the problem of sampling in nutritional studies and it has been found that current needles from the uppermost shoots provide the most suitable material for foliar analysis. These investigations have been written up and are awaiting publication. The interpretation of these findings in terms of mineral deficiencies limiting tree growth is being checked up by a number of manurial trials in various parts of the country. In collaboration with H.M. Forestry Commission (Research Branch) field trials have been started to test the effect of various treatments (N. fertilizing, foliar sprays, shading of the ground vegetation, etc.) on the growth and mineral nutrition of checked Sitka spruce on heathland plantations. A manurial experiment with *Tsuga* has also been initiated.

Laboratory investigations are continuing into the influence of various environmental factors on root metabolism and growth in a number of tree species. In collaboration with L. Z. Rousseau (Athlone Fellow) an apparatus has been constructed for, and successfully applied to, the precise measurement of seedling root growth under conditions of different oxygen supplies and different temperatures.

SOIL SCIENCE

As in previous years, the Reader in Soil Science, Dr. E. W. Russell and Mr. G. R. Clarke, gave special undergraduate courses of lectures for forestry students, while Dr. Russell also gave a course on tropical soils. Dr. Leyton gave a course on soil biology.

Dr. Handley continued his investigation of the processes of litter decomposition. Attention is being directed towards the breakdown of nitrogenous constituents of the litter of different species by enzymes. Liberation of nitrogenous material from litter is also being studied by the use of a perfusion technique.

Studies on the release of nutrients for plant growth, from litter decomposing in soil, have commenced, the growth and composition of tree seedlings being used for assay purposes. Three different soils and quartz sand, representing different levels of initial nutrient supply, have been used in conjunction with the litter of four different plant species along with appropriate control pots without added litter. Sitka spruce seedlings have been used as assay plants. At the end of the growing season the growth of the seedlings and the nutrients absorbed will be determined.

During work carried out earlier, on the processes of raw humus formation, problems arose which made desirable a biochemical investigation of the protein precipitating materials present in the leaves of various plant species. The Forestry Commission have provided financial aid for such work to be carried out. At the end of January, 1955, Dr. H. Raudnitz commenced work on these protein precipitating substances in leaves. A laboratory has been furnished and equipped for these investigations, and so far, crude materials

containing protein precipitating factors have been isolated from *Rhododendron* leaves. These materials require purification and identification of the active constituents before being used in connection with various biological studies related to problems of litter decomposition.

FOREST BOTANY

Mr. A. C. Hoyle continued to be Curator of the Forest Herbarium. By agreement between the Professors of Botany and Forestry, the whole staff of the section, unchanged from last year, was united once more under the Department of Forestry for administrative purposes as from March 1st, 1955, although the herbarium accommodation necessarily remains in the Department of Botany where its proximity to the other herbaria and the Botany Library confers obvious advantages.

Teaching. Mr. Hoyle gave the usual courses in Systematic Botany and in the Ecology of Tropical Dry Woodlands. The policy of insistence on students' botanical collections being properly done, together with constant propaganda by personal contact and exhortation, shows signs of producing improvement in the quality of field collection and annotation. As in previous years, the herbarium was constantly used by the students and forest officers; among them, one Pakistani student completed the second-year syllabus in Regional Systematic Botany under Mr. Hoyle's supervision, and another (from Kenya) was supervised for a similar course by Mr. White. Three Colonial Forest Probationers received supervision on the woody flora of their territories (Nigeria, Uganda). Considerable assistance was given to two Northern Rhodesian officers on the botanical side of their timber study.

Research and Advisory Work. Mr. Hoyle continued his study of *Brachystegia*, completing his MSS for Mr. R. W. J. Keay's revision of the Flora of West Tropical Africa (co-operation in which continued in general as before) and for the *Conspectus Florae Angolensis* in collaboration with the British Museum and Lisbon. During these revisions it became necessary to publish a description of one new species for West Africa and to separate one Gaboon species as a new genus. A pleasant feature of the latter publication was the willing co-operation of M. Aubréville in taking photographs and notes in the field during a recent visit to the Gaboon. Numerous *Brachystegia* specimens were received and named, notably from the Belgian Congo, French Cameroons, Northern and Southern Rhodesia, and Tanganyika. A happy and productive liaison has been established with Mr. B. Anderson of the Tanganyika Agricultural Corporation for the supply of intelligently collected specimens. Mr. N. Pritchard, on the Oxford University Expedition to Angola, provided a small but indispensable collection from a type locality which has solved more than one puzzling problem.

Mr. White continued his revision of the genus *Diospyros*. A large consignment of very valuable duplicate material from the

Belgian Congo was presented by the Jardin Botanique de l'Etat, Brussels and several hundred specimens have been received on loan from various Botanical Institutes. Two papers were completed during the year and are ready to go to press. During the year, the large collection made by Mr. White on Mt. Kenya in 1949 was named, mounted, and laid away. In February, Mr. White completed the checking of the 'nomenclature of the species included in the British Standards revision of *Nomenclature of Commercial Timbers*. Since then, a loose-leaf catalogue comprising all species included in the list has been made, so that information can easily be filed and will be readily available if future revisions are needed; this work was competently undertaken by Mrs. R. T. Fenton, a graduate botanist whose part-time services were made available to the section.

Miss M. E. Griffiths continued her work on *Terminalia* in Tropical Africa. All the available type material has been examined and illustrations and descriptions of twenty-eight species have been completed. The few remaining species will soon be completed, as adequate material has recently become available. Her work has been greatly facilitated by the receipt of valuable collections of carefully correlated material specially made by the Forest Department, Sierra Leone, and the Branch of Botany and Plant Pathology, Southern Rhodesia. A large amount of material has also been received on loan from most of the larger European and African herbaria.

Northern Rhodesian Check-list. Mr. Angus spent the whole of his time working on the Northern Rhodesian Check-list. The writing of the final draft was continued throughout the year and constituted the major activity of the section. By the end of the year, three-quarters of the woody species had been described and most of the keys to the genera and species completed. Numerous dissections and drawings made by Miss M. E. Griffiths and Miss J. Chandler have been of great value in this work.

Visitors and Enquiries. Among visitors who worked for short periods in the Herbarium were Messrs. R. W. J. Keay and F. N. Hepper from Kew, Mr. J. K. Jackson from the Sudan and Mr. B. Anderson from Tanganyika. The herbarium was honoured by a visit from Professor J. M. Schulze, Director of the Botanical Museum at Berlin-Dahlem, who came to arrange resumed co-operation. The visit of the British Association was the occasion for assembling an exhibit, illustrated by Miss Chandler, of material and evidence on the significance of the suffruticose habit, a subject that has interested Mr. Hoyle and Mr. White for some time. The number of requests to Mr. Hoyle for identification of timber-correlated specimens from the Forest Products Research Laboratory and their correspondence broke all records. Fortunately, private enquiries were fewer than usual.

Forest Herbarium. During the year, 2,584 specimens were mounted and filed, approximately 1,000 less than last year owing to Miss Chandler being engaged on other duties, especially botanical illustration. Specimens received for identification number 872.

mainly from Anglo-Egyptian Sudan, Nyasaland, North Borneo, Northern Rhodesia, and Uganda. Named duplicates received amounted to 1,065, the principal sources being the East African Herbarium, the Forest Research Institute, Kepong and the Jardin Botanique de l'Etat, Brussels. Identifications and corrections sent out totalled 703. The following territories received identifications: Nigeria (78, mostly made by Mr. R. W. J. Keay in connection with his revision of the *Flora of West Tropical Africa*), North Borneo (17), Northern Rhodesia (282), Nyasaland (280), Swaziland (6), and Uganda (40).

FOREST PATHOLOGY

Mr. W. R. Day continued in charge of the section, with Mr. F. H. Jones (Chief Technical Assistant) as chief assistant, together with Mr. D. K. Barrett and Miss H. M. Penn. The usual courses of instruction were given for the Honours School and the special course in Forest Hygiene for the postgraduate students.

Research (1) *The causes of the failure of Sitka spruce in North-Western Europe.* Two months were spent during the summer of 1954 in Belgium, Holland, Denmark and Germany, examining plantations and the soil conditions under which they were growing. Many thanks are due to the Forest Departments in these countries, and especially to the Research organizations, for help given and interest shown in this work. A report has been sent in to the Forestry Commission who made the study possible by meeting the travelling expenses. It is not possible effectively to summarize the results in a few words, but the main conclusions are as follows: A wide degree of site tolerance in Sitka spruce, as it occurs in Western North America, around latitudes 53° to 54° N., seems clearly to be associated with a climate which is cool and damp, as compared with that which usually prevails in similar latitudes in Western Europe; which has a short relatively dry period during the latter part of the summer; and in which the condensation of moisture on leaves and twigs is of frequent occurrence. The countries round the North Sea, have, on the average, higher summer temperature, a lower rainfall, especially during the late winter and spring; and, in general, experience a higher rate of evaporation. The consequences of this are that, on any moist, reasonably fertile soil, Sitka spruce exhibits in North-Western Europe, a fairly high rate of growth during the first decades after establishment but also, because of this, develops a rapidly accelerating demand for soil supplies and probably especially for water. This demand must, in the main, be satisfied from the supply stored in the soil after the winter: this is especially true in years with dry summers. It can be shown that the sites on which Sitka spruce has failed tend in general to limit full and satisfactory root development and to be unsatisfactory as regards water supply or aeration, or both. This failure in root development and root supply provides the foundation for the failure of Sitka spruce in

North-Western Europe and for the attacks by root-infecting fungi and the giant bark-beetle, *Dendroctonus micans*, which have commonly been associated with it. Careful examination shows that the actual death of trees merely exhibits an extreme condition which is shown less severely, and often not to a critical extent economically, in regions in which the conditions of climate and soil are relatively favourable. These conclusions are entirely consistent with what was observed within the forests in British Columbia to which Sitka spruce is native.

(2) *Injuries on Sitka spruce*. It was observed, when travelling in North-Western Europe, that the death of bark on the lower part of the main stem was fairly common in plantations which were beginning to fail. Anatomical examination in Sitka spruce affected in this way in Glentress Forest (Report 1952-53), and of Douglas fir in Dymock Forest (Report 1953-54), suggests strongly that a deficiency in water supply within the region of the cambium provides the basic foundation for this phenomenon. This is entirely consistent with the general diagnosis of the causes of failure of Sitka spruce outlined above.

(3) *Injuries on Japanese Larch*. Two further severe occurrences of these have been observed, one in North Devon, the other in North Wales. The relationship of death of bark with brashing has been maintained except that it appears that, in part of the plantation in North Wales, the injuries occurred before brashing took place. This is being investigated more closely. This plantation provides an opportunity to carry out further brashing under observation and at different times of the year, and this will be done with the help and co-operation of the Forestry Commission Research Branch. Mr. Barrett is in charge of the field work so far as this section is concerned.

(4) *Injuries on Douglas fir*. Further observations at Dymock Forest have shown very clearly that death of bark may occur at the base of branches in the crown, without any mechanical injury. This is in accordance with occasional observations on other species, including Japanese larch and Norway spruce, that this type of bark necrosis may occur under conditions in which the main stem is completely protected from mechanical injury and in which there has been no insect attack within the necrotic area.

The conclusion seems to be clear that in this type of bark necrosis, one is concerned with a phenomenon which may appear on a number of species of tree, both coniferous and broad-leaved, and the suggestion is that the foundation factors for its development may be the same irrespective of the species affected.

(5) *Wind-throw, drought crack and root disease*. The strong winds at the end of March, 1955, overthrew a number of trees and gave opportunity for the examination of root-systems. Observations were made on Douglas fir in Tubney Woods, near Oxford, and on this species and also Sitka spruce and Grand fir in Dunster Forest, Somerset, and Eggesford and Okehampton Forests, North Devon.

The root systems of all species showed a certain amount of die-back; but in Somerset and Devon it was quite clear that the Douglas fir had been much less affected, at an age of between thirty to thirty-five years, than either Sitka spruce or Grand fir. The soils examined were brown forest loams overlying Devonian rock and, in the case of the Grand fir, there was a relationship suggested between severity of drought crack, depth of loam over rock and degree of slope of ground. On these freely draining soils with a rock subsoil, both the fir and spruce had suffered severely from death of heart roots, the whole central mass of the root system having died in many cases. Where this severe dying back of the central part of the root system has taken place its effect is to be seen in an undue thinning of the foliage.

It is to be noted that in Tubney Woods, on deep compact sand, Douglas fir of about the same age as the above mentioned trees has suffered severely from root die-back and shows all the symptoms of Sitka spruce in process of failure. For a number of years, *Fomes annosus* has been observed on these trees consistently; it is to be noted, however, that root die-back is rarely followed by death of the tree, it being usual for a redevelopment of the root system to take place adequate to keep the tree alive. This seems to be a clear case of the limited pathogenicity of this fungus.

(6) *Beech bark necrosis*. A summary account of this work has been prepared, but all further investigation is in abeyance, for the time being, owing to pressure of other work.

(7) *Die-back and canker of European larch*. The analysis and summarising of several years' work is at present in progress and will, it is hoped, be ready for report during the coming year. Some further inoculation work is being carried out in the plantations at Southmoor, with the kind permission of St. John's College. These plantations present different conditions, especially with regard to the microflora of stems and branches, as compared with the Welsh plantations previously worked in and will, it is hoped, provide new information.

(8) *Conference on Root Infections and especially Fomes annosus*. A conference was held at Wageningen, Holland, under the auspices of the International Union of Forest Research Organizations, to discuss this subject. Mr. Day had the pleasure of attending this: it proved to be of value, not only in connection with the subject immediately under discussion, but also in relation to the failure of Sitka spruce, which was the main subject of his investigations last summer. The proceedings of the conference are to be published.

Other items. Work has been proceeding for publishing the account, already issued as a report, on the work carried out in British Columbia on Sitka spruce. It is hoped to finish this during the summer of 1955.

Exhibitions for instructional purposes have been arranged during the year. Mr. Woodward (photographer) and Mr. J. S. Shaw (artist) have again proved most helpful in connection with these.

It is hoped to begin an account of past work on bark necrosis as soon as the present work on Sitka spruce has been completed. This will probably take some time in preparation.

Grateful mention of efficient support given by the technical staff has again to be made. Miss Penn resigned to get married at the end of the year; she was a valuable and competent assistant.

FOREST ENTOMOLOGY

Mr. G. H. Thompson continued in charge of this section in which no staff changes occurred.

Teaching. The usual courses of lectures in Forest Zoology and Animal Ecology were given to the junior-year. The advanced course in Forest Entomology was attended by one final-year student and one Colonial Forest Officer. Two students of the final-year worked on the Grey Squirrel and Beech Scale (*Cryptococcus fagi* Baerunsprung), respectively, as their special subjects.

Research. Progress was made in the compilation of a preliminary insect/host-tree list for the Gold Coast. Completion of this work awaits the receipt of a number of identifications.

The second annual analysis was made of ash and sycamore billets laid down in 1953 in Wytham Wood for the study of insect succession, the bark of both species was unbroken but very loose and the initial stages of decay were apparent in the wood. The fauna was scarce, both in number of species and individuals and was restricted to the surface, within, and beneath the bark. The billets appeared to be at the stage at which the bark fauna was decreasing whilst the wood was still unattacked.

Ecological studies continued on the alder woodwasp (*Xiphydria camelus* L.) and its parasites. This work was greatly facilitated by the erection of a shelter for insect gases.

Miscellaneous. At the British Association Meeting at Oxford in September, 1954, Mr. Thompson read an introductory paper at the joint symposium between sections D (Zoology) and K* (Forestry) on the subject of 'Animal Populations and Forestry'.

Mr. Thompson read a paper entitled 'The Alder Woodwasp and its Parasites' to the Association of Applied Biologists during their summer meeting held at Oxford, in July, 1955.

MANAGEMENT

The general organization of the normal courses in Forest Management remained unchanged. The first-year course consists of twenty-four lectures, a tour in the forests of Normandy and the Landes, and four weeks of practical work in the New Forest in September. In the second-year course, there are sixteen lectures, two weeks of practical work in the New Forest and a tour in the French and Swiss Jura.

Lectures were given to the second year students by Mr. N. V. Brasnett and to the first year students by Mr. F. C. Osmaston,

helped by Mr. T. E. Edwardson, on the aspect of management in Britain.

The practical work in the New Forest comprises field work for the compilation of a working plan by each student. In September, 1954, the area (518 acres), the growing stock and site were described, enumerated and assessed so that Part I of the plan could be written. The tract carried generally poor maturing hardwoods with some conifer plantations, thus presenting a typical problem of rehabilitation to attain ultimate sustained yields and improved production of both hardwoods and conifers according to sites, a problem typically aggravated by the demands of amenity.

After criticism of their draft Parts I, students were given the objects of management so that they could complete their plans with detailed prescriptions for the next ten years.

Supervision and assistance were also given to post-graduate students who were making special studies in forest management, such as modern trends in management, the working of moist, tropical forests, and preparation of working plans.

In June-July, 1955, there was a special management course for eighteen Forest Officers on leave or deputation from the Dominions and Colonies. The course of lectures and subsequent discussions covered the role of working plans and their control, the trends in modern management and mensuration, the management of undeveloped forests, plantations and young afforested areas as well as grazing and fire management, the role of planned communications and the maintenance of records. The extensive tours in private, communal and state forests were designed to illustrate the general subject matter of the lectures.

The course was the first of its kind and proved very successful. This success was only possible because of the co-operation and assistance rendered by the teaching, field, and specialist staffs of the various state, federal, cantonal or other organizations in the three countries visited. A large number of eminent continental foresters gave freely of their time to help organize the tour, to provide lectures on the latest developments in site mapping, enumeration, revision of working plans, records and control, and to demonstrate in their forests the application and results of their methods. The party particularly appreciated the fact that they were not shown exclusively, forests in which management had been easy and successful, but sometimes areas in which problems still remained to be solved or past mistakes rectified.

MENSURATION

Teaching. The usual undergraduate courses including practical work in Bagley Wood were given by Mr. Edwardson. An advanced course on selected points in mensuration was given to post-graduate students. No permanent sample plot in Bagley Wood was measured in the year.

Research. Mr. Edwardson continued with the project in the Dean and Highmeadow Forests for the estimation of growing stock and

increment from a stratified random sample of yield plots. In the present year, the work covered the conifers on the Coal Measures, 101 plots being laid out to represent 1,870 acres. There are now, in all, 413 plots covering 1,167 acres and representing nearly 10,000 acres of forest in the Dean and Highmeadow. The remaining plots will be completed next winter.

Analysis of the data has been delayed as a result of staff changes in the Department of the Design and Analysis of Scientific Experiment.

Mr. Edwardson also carried out further measurements in the Parmoor beechwoods on a sampling basis to complete the current investigations into growing stock and growth in these woods. In September, 1954, he demonstrated the work in hand to the British Association party at Parmoor.

Supervision was given to an advanced study by Mr. G. P. A. Forbes of the problems of sampling in tropical rain forest enumerations, with special reference to British Guiana.

Visits and Visitors. In May, Mr. Edwardson served as Recorder at the Lakes Excursion of the Foresters of Great Britain. He showed Professor Kurth (Zurich) over the work at Bagley Wood and Dr. Inal (Turkey) over the Dean enumeration project.

Institute Paper. Mr. Edwardson sub-edited a manuscript submitted by Mr. H. R. Gray, Commonwealth Forestry and Timber Bureau, Melbourne, on the topic, 'The Form and Taper of Forest Tree Stems' in preparation for publication as an Institute Paper.

Miscellaneous. Mr. Edwardson gave lectures and field demonstrations on aspects of British forestry to the Association of Applied Biologists (Wytham), Denman College, W.R.I. (lecture) and Longworth Forum (lecture).

Mr. Edwardson, in consultation with the British Council and the Forestry Commission, was responsible for arrangements for a British Council Course in Forestry to be held in Oxford, in September and October, 1955.

AERIAL SURVEYS

The course in aerial survey for post-graduate students was given jointly by Major-General R. Ll. Brown and Dr. Dimbleby. Mr. F. C. Osmaston assisted Dr. Dimbleby preparatory to taking over the Forestry Interpretation part of the course next year.

STATISTICS

Mr. J. M. Hammersley again gave a course of lectures on elementary statistics for Forestry students. The thanks of the department are due to the Reader in the Design and Analysis of Scientific Experiment for permitting him to do so.

Computing Officer. Mrs. Allington's services in computing have been in considerable demand, but she has had a certain amount of time free for helping with other work, notably the preparation of diagrams and in the general store of glassware, chemicals, etc.

WOOD ANATOMY

Dr. L. Chalk continued in charge of the section, with Mr. A. A. Shaw and Mr. P. G. H. Franklin as his assistants. The usual undergraduate and post-graduate courses were given. Three Forest Officers carried out advanced studies in this subject, which was also chosen as their optional 'special subject' by three undergraduates. Professor N. Berkel of Istanbul, Turkey, visited the Institute for a term to study the techniques used in wood anatomy and methods of description.

Research (1) Timbers of Northern Rhodesia. Mr. W. R. Bainbridge and Mr. D. P. Bands completed a punched card key to ninety timbers from Northern Rhodesia and a corresponding set of photomicrographs at low magnification ($\times 10$), obtained directly from the surfaces of small blocks.

(2) Timbers of Sarawak. Mr. J. A. R. Anderson made a punched card key to a large number of specimens, including eighty-eight genera, collected in connection with a study of the swamp forests of Sarawak.

(3) Ray volumes in hardwoods. This study was completed and published. Ray volumes ranged between 5.3 and 59.3 per cent. of the volume of the wood, about 70 per cent. of the species having ray volumes of between 9 and 24 per cent., compared with a mean value of 7.8 per cent. for conifers. Proportion of ray tissue was found to be positively related to ray size as indicated by the maximum number of cells wide.

(4) Moisture in the living tree. This investigation was extended to Douglas fir by Mr. J. M. Bigg, who studied the general distribution of moisture in the lower part of the stem and the effect of brashing and of pruning large roots. In the Sitka spruce investigation, a technique was developed for obtaining the saturated weight of the samples so that the moisture content could be expressed as a percentage of saturation. It was found that the pattern of moisture distribution expressed in this way differs appreciably from that obtained with conventional moisture contents expressed as a percentage of the oven dry weight. This method tended to remove or lessen the differences between suppressed and dominant trees and many of the unexplained fluctuations obtained with conventional moisture content. It was observed in both Sitka spruce and Douglas fir that abrupt changes in moisture content might occur locally, with drier patches running either longitudinally, as in the dry strip developed above a severed root, or as drier zones at different depths inwards from the cambial layer.

(5) Variation in fibre length. Variation in fibre length in storeyed woods was further investigated by Mr. J. P. de C. Walsh with a view to confirming the hypothesis put forward by Marstrand (see last year's Annual Report) that the lack of any increase outwards in fibre length after the second ring in *Pterocarpus angolensis* is due to the method of cambial division in storeyed woods. Two further storeyed woods were studied, *Aeschynomene elaphroxylon* (Guill. et

Perr.) Taub and *Nesogordonia papavifera* (A. Chev.) Capuron, and it was shown that not only do the fibres show no increase outwards but that mean length of the parenchyma strands remains remarkably constant. Marstrand had observed that fibre length in *Pterocarpus* rose to a maximum in the middle of each growth ring. This was found to occur also in the other two species, but in all three the length of the parenchyma strands remained constant throughout the ring, indicating that changes in fibre lengths within the ring must be the result of elongation of the cells after they have been cut off by the cambium, and not of changes in the lengths of the cambial initials.

(6) *Tension Wood*. Mr. D. F. Dyer carried out an investigation into the effect of tying stems and branches of poplar, birch, and ash in various positions, using coiled springs to measure the force exerted by the development of tension wood during the last two months of the growing season (August and September). The pull exerted by the branches tied down was much less than that by the branches tied up and by the main stems. Tension wood in branch and stem was developed on whichever side would tend to restore the natural position if the tension wood contracted longitudinally. This was not always on the upper side, tension wood occurring on the lower side of branches that were tied upwards. Tension wood in ash was not as well defined as in the other two woods, but the pull exerted by the main stem was slightly greater than in the other species.

Terminology. Dr. Chalk has been appointed Chairman of a Committee of the International Association of Wood Anatomists that is preparing a revision of that Association's *Glossary of Terms Used in Describing Woods*.

The Wood Collection. Additions to the collection were received from the Colonial Forests Departments of Northern Rhodesia (per Mr. D. B. Fanshawe), Sarawak (per Mr. J. A. R. Anderson), Sierra Leone (per Mr. J. E. F. Douay), and Uganda (per Mr. C. H. Tack), and from the Centre Technique Forestier Tropical, Paris (per M. D. Normand), the Forest Products Research Laboratory, Princes Risborough, Yale School of Forestry (per Professor W. L. Stern), Iraq (per Mr. F. W. Baltaxe), Liberia (per Mr. W. W. Fobes), and Chile (per Mr. C. W. Scott).

FOREST ECONOMICS

Mr. J. J. MacGregor continued in charge of this section. Mr. F. E. Balman and Mr. T. W. Irvine were mainly concerned with the Survey of Private Forestry Costs. Mrs. J. F. Darby left the section in February, 1955, and was temporarily replaced by Miss S. Clark.

Teaching. (1) Courses of lectures and tutorials were provided for the Honours School of Forestry on general economic theory, forest economics, and the optional subject of British forest law, land tenure and taxation. Seminars, based on a study group which

examined the main economic problems having a bearing on the forestry of three colonial regions, were arranged for the Colonial Forest Officers.

(2) The Forest Economist was in charge of a party of eight Forest Officers on leave, who attended a short course on forestry costing which involved visits to private and Forestry Commission estates.

(3) The Forest Economist supervised two post-graduate studies, one on the allocation of economic resources between forestry and agriculture, and one on the growth and developments of agricultural estates in the nineteenth century.

Research (1) *The Survey of Private Forestry Costs* continues to be the main item of research. About seventy estates in England and Wales have co-operated to provide economic data including those used in the compilation of the Third Annual Report covering the two years 1952/53 and 1953/54. In June, 1955, a one-day conference on costings was attended by representatives of about half the estates co-operating in the survey and the Forest Officers on the short course.

(2) *Study of Prices of Home Grown Timber*. A postal enquiry issued with the January number of the *Quarterly Journal of Forestry* was the main source of data for a study of the prices received by woodland owners in 1954. About eighty private estates provided information for over 380 separate sales.

(3) *Other items*. In collaboration with Dartington Hall, an article was produced for a special issue of the *Journal of Agrarian Affairs* on the theme of 'Competition or Co-existence of Agriculture and Forestry'. A talk on forest policy was given to the Berkshire branch of the Council for the Preservation of Rural England.

The Forest Economist was nominated in March, 1955, as the United Kingdom representative to the Study Group on a Multilingual Glossary of the joint F.A.O./E.C.E. Committee on Forest Working Techniques.

FOREST LAW

As in the previous year, lectures on the Law of Evidence and of Contract were given to the officers by Mr. J. D. Davies, now Law Tutor of St. Catherine's Society. Mr. W. A. Gordon, being a qualified barrister, will take over most of the teaching of this subject.

COLONIAL FOREST ADMINISTRATION

Mr. N. V. Brasnett gave eight lectures and some tutorials and Mr. W. A. Gordon gave the remaining four lectures on the various aspects of forest administration in the colonies to those students who elected to take the optional paper on the subject in the Final Honour School.

FOREST UTILIZATION AND ENGINEERING

The usual course of lectures in forest utilization and engineering was given to first- and second-year students. A road alignment was carried out at Wytham and a small timber bridge project over the Cherwell. Lectures were given to Colonial Forest Officers on timber grading, saw-milling and extraction, and a demonstration of timber hauling and loading with wheeled and tracked tractors, was held at Bagley Wood. New types of chain-saws were also demonstrated.

A practical course on the maintenance and sharpening of saws was given in the workshops. A short course of eight lectures and demonstrations on vehical maintenance was again given at the local workshops of the Royal Electrical and Mechanical Engineers (T.A.).

Two lectures were given by representatives of the United Africa Co. on the economic aspects of mechanisation of timber extraction in the tropics and a lecture was given by Mr. J. D. Braithwaite on the marketing of colonial timbers. Mr. J. D. Roach, of the Bowater Corporation Ltd., gave a lecture on the use of tropical hardwoods for pulp and fibre boards and Dr. W. P. K. Findlay, of the Forest Products Research Laboratory, lectured on 'The Protection of Field Timber from Decay, with special reference to Tropical Conditions'. Mr. Gordon-Jacob, of Chester, gave a special lecture to the O.U. Forest Society on 'Optimum Softwood Saw-log Sizes', which led to an interesting discussion.

Final-year students attended a short course of demonstration at the Forest Products Research Laboratory and Colonial Forest Officers attended a series of discussions with the research staff on the particular subjects in which they were interested.

Visits were made by the Colonial Forest Officers to Messrs. William Mallinson and Sons, Ltd., where the handling and grading of tropical timbers was studied in the dockyards and a very interesting display of veneers was visited in the showrooms of this well-known firm. Our thanks are due to Messrs. Mallinsons for receiving our Forest Officers again this year and especially to Mr. Richardson, who planned and conducted a particularly useful tour round the timber yards. Furniture factories and seasoning kilns were also visited at High Wycombe.

FOREST PROTECTION

The usual course of lectures on fire protection was given to first-year students. Several of the students had taken part in fire-fighting during their practical work in Eastern Canada. Lectures were also given in the protection of mountain slopes and counter-erosion methods.

SURVEYING

The usual course in surveying was given in the Trinity Term by Major-General R. Ll. Brown. The thanks of the Department are given to the Reader in Surveying for permitting him to do so.

LIBRARY

Miss Guiney continued in charge of the Library, with Mr. Hemmings and Miss Castell (after Mr. Dieneman's departure in September) as assistants.

Statistical information, with comparative figures for the previous year, are:

Accessions:

Issues of periodicals	...	...	1,801	(1,944)
Books	...	...	142	(200)
Miscellaneous Items	...	...	958	(1,944)
			<hr/>	
			2,901	(4,088)
			<hr/>	

To the total accessions, the Commonwealth Forestry Bureau contributed 361 (442) and 130 (230) were obtained by direct request from various institutions.

Loans:

To Staff:

Periodicals:

in circulation	...	2,682		
direct	...	315		
		<hr/>	2,997	
Books	...	...	372	
Other items	...	...	321	
			<hr/>	
			3,690	(3,092)

To Students:

Periodicals	...	...	617	
Books	...	...	1,268*	
Other items	...	...	711	
			<hr/>	
			2,596	(1,803)

To Bureau Staff:

Periodicals	...	...	215	
Books	...	...	87	
Other items	...	...	56	
			<hr/>	
			358	(537)

To Local Visitors and to Correspondents by Post:

Periodicals	...	...	281	
Books	...	...	83	
Other items	...	...	214	
			<hr/>	
			578	(540)
			<hr/>	
			Total loans	7,222 (5,972)
			<hr/>	

Note: Heretofore categories of loans have not been given.

* 182 books most in demand are in the 'Reserve' section for short loan only.

New Periodicals began coming from the Association pour l'Etude taxonomique de la Flore d'Afrique Tropicale (A.E.T.F.A.T.), Australia, Denmark, Germany, New Zealand (2), Norway, Switzerland, United Kingdom, United States, U.S.S.R. (11 in all).

New Series entered, chiefly on an exchange basis, came from Argentina, Australia (2), Belgium, Brazil, Bulgaria, Canada (3), China (2), Columbia, F.A.O. (3), France (4), Germany (8), Greece, Hungary (2), Japan, India, Madagascar, New Zealand (2), Nigeria (3), Spain, Tanganyika (2), Union of South Africa (3), United Kingdom (8), U.S.A. (15), Yugoslavia. (69 in all.)

The addition of a number of these periodicals and series was initiated by the sending of samples by the institution concerned and by offers to the Bureau with a view to exchange. As the Bureau does not exchange publications, such offers and any subsequent arrangements are taken over by the library as a matter of routine; when equivalent value warrants, subscriptions to *Forestry Abstracts* are paid for by the Institute for sending abroad; mainly, however, Institute publications are in demand. The chief exception is our receipt (on deposit for the Bureau) of United States Government material coming through the Commonwealth Agricultural Bureaux headquarters.

Correspondence. Letters sent, 1,660 (1,826); received 1,056 (1,023).

Sales. Institute publications were sold, either in the library or by post for a total sum of £122. 12s. 11d. (£128. 18s. od.). Many publications issued by the Forestry Commission, the Forest Products Research Laboratory, and other sources were also sold, a stock of such material being kept in stock for the convenience of students.

Catalogue Room. Mr. Hemmings, who is in charge of the catalogue room, reports that a total of 24,117 (22,523) cards were added to the catalogues.

For the Bureau's Title Service, some 141,998 (88,631) cards and 'filmsies' passed through the Banda duplicating machine and were distributed to 33 (23) recipients, some of whom subscribed for two or more sets.

The necessary corrections to the cards affected by the final (1953) amendments to the Oxford Classification were completed.

An exhibit was displayed at various functions demonstrating the use of a bibliography to all forestry workers.

A work study, in the form of a graph, shows the related activities of Bureau and Institute, plots their development and illustrates the smoothing out of the flow of work. Provision of space for the ever growing card index, now containing 221,934 cards, continues to be a problem, which has been temporarily met by adding a second series of cabinets above the existing series. The current growth of the catalogues necessitates the addition of forty index drawers annually.

The magnitude and scope of the bibliography surprises visitors, such as the members of the Oxford Library Club, who examined it during the winter.

Staff. Mr. W. Dieneman left in September, having been appointed assistant librarian in the University of Nigeria at Ibadan. In November, Miss D. R. Castell (M.A. Oxon.) was selected from amongst numerous applicants to join the staff in his place. Miss Sylvia Bishop left in September, 1955, in order to give full time to study for librarianship qualifications; by the end of the report-year, her successor had not been chosen. During March, April and May, the librarian was absent on sick-leave (except for brief periods); recognition is due to the success of the subordinate staff for keeping the library running smoothly meanwhile.

General. At the beginning of Michaelmas Term, the usual demonstrations of library routine were given by the librarian and Mr. Hemmings to Forest Officers, post-graduates, probationers, and first-year students. The Library Bulletin appeared in twelve numbers and was distributed to about fifteen exterior libraries as well as to each member of the teaching and research staff. Pressure on space necessitated the transfer of working plans, other than United Kingdom examples, to a room on the top floor now used for study by Forest Officers. At various times during the year, special exhibitions were set out, the chief occasion being the meeting of the British Association for the Advancement of Science, in September, when on the Open Evening, upwards of 800 guests visited the Institute and saw, in addition to the library exhibition, an ingenious coloured lighted set in four stages, illustrating the use and value of the Bibliographical Indexes contrived by Mr. Hemmings and the staff artist, Mr. Shaw.

Visitors included Mrs. Widman, librarian at F.A.O. headquarters in Rome, who used the library for several days in connection with work at the Bureau, and Mr. John Larson, representing the American Forestry History Foundation at St. Paul, Minnesota, whose special interest was the investigation of the influence of European ideas on the development of scientific forestry in the United States during the nineteenth century. For his purpose, our pre-1934 'Troup' subject-index with references to publications in the library dating back to about 1820, was immediately useful; altogether Mr. Larson spent about a month in the library. We were also glad to welcome, among others, Miss M. Westwood, of the Australian Forestry and Timber Bureau, Canberra; Mr. Arthur Meyer, editor of the *Journal of Forestry*, Washington; Professor J. S. Boyce of Yale University; Professor S. A. Wilde, of the University of Wisconsin, Madison; and Dr. Stone, of Ithaca University, New York.

Gifts. Particularly noteworthy enrichments made during the year are: *Thesis on the Utilization of Forest Products in Nigeria*, submitted in 1939 by Joseph W. Mackay, from Mrs. E. W. Mackay; about sixty books on forestry subjects, many of them long sought, from the University Department of Agriculture; Aristeguieta's book giving keys and descriptions of Venezuelan trees, from the Jefe del Instituto Botanico, Caracas; reprints of his own and other articles on afforestation of slag-heaps from Mr. N. D. G. James; C. A.

Schenck's book on the Biltmore Forest School from Mr. John Larson; his *Southern Rhodesia Botanical Dictionary of Native and English Plant Names*, from Dr. H. Wild; Müller's *Recherches sur les formes naturelles de l'Humus*, 1884, from Professor Romell; and reprints from Professor Stebbing and Mr. V. S. Rama Das. These and a number of other donors, especially those institutions whose sustained or occasional generosity cannot be detailed, are offered our sincere thanks.

The residue of Mrs. Aspin's gift three years ago in memory of her daughter Isobel, was expended on the purchase of an oil painting of Mevagissey Harbour, by Dr. W. H. Wilkins, for the librarian's room which is now embellished by six pictures, and a Blaeu map of Oxfordshire, 1630. This small gallery forms an apt memento, in its colour, light and diversity, of our colleague who left us in 1947 and died, so young, in 1952.

PHOTOGRAPHIC SECTION

The demands on the photographic section, staffed by Mr. H. F. Woodward and one assistant, during the past year have been the heaviest yet experienced. Items processed include 6,408 (3,840) prints and enlargements, 1,629 (1,258) negatives, 74 (163) lantern slides. 396 (275) photographs and photomicrographs have been taken and a number of miscellaneous items, including measuring scales, photographic stencils, etc., have been dealt with.

A new process has been introduced, by means of which the surface of labels, notices, diagrams, maps, etc., can be rendered impervious to dust, grease, and water and given considerable resistance to wear and tear. This is achieved by heat sealing with a very thin skin of transparent plastic.

Repairs and additions to the print collection have continued, also operation and maintenance of the projection equipment.

Duplicating work has amounted to 105,000 (98,000) impressions, plus the Library Bulletins and a considerable number of lecture notes and diagrams printed in colour on the spirit duplicator.

WORKSHOPS

The Workshops continued with two metal workers, Mr. E. J. Howell and M. A. A. Bowman, and one wood worker, Mr. J. Howkins.

Major construction during the year included:

Woodwork:

- (1) Two periodical filing cabinets in *Ramin*.
- (2) A tracing table in *Oak*.
- (3) A root growth apparatus.
- (4) A laboratory bench and shelves in *Iroko*.
- (5) Two map cases in *Oak*—Library.
- (6) A bench for the multiscope

Metal:

- (1) A shelter for insect breeding cage, equipped with adjustable shelving and glass roof.
- (2) A special stand for Kine Exacta Camera for 'close-up' photography.
- (3) Two micromanipulators.
- (4) Six hypsometers.
- (5) Six map carrying fittings for Library diagram cases.
- (6) Overhaul of multiscope.
- (7) Copper crucibles.

Much time was spent this year in the overhaul and modification of various types of apparatus.

H. G. CHAMPION,
Profesor of Forestry.

APPENDIX I

PUBLICATIONS

GENERAL

Original Publications

The Development of Photo-interpretation in Forestry, by G. W. Dimbleby, *Aerial Survey Review*, No. 10:2 (1955).

Forestry in Great Britain, the Commonwealth and Europe during 1955, by A. H. Lloyd. *Encyclopædia Britannica 'Book of the Year'*.

Reviews

Forests of France, by J. L. Reed. pp. 296; 9 plates and 1 map. *Quarterly Journal of Forestry*, 49:64-5 (1955) (E. W. Jones).

Directorate of Colonial (Geodetic and Typographical) Surveys: Annual Report for the year ending 31st March, 1954. *Empire Forestry Review*, 34:99-100 (1955) (G. W. Dimbleby).

SILVICULTURE

Original Publication

Ecological studies on the rain forest of Southern Nigeria II: the plateau forest of the Okoum Forest Reserve, by E. W. Jones. *Journal of Ecology*, 43:564-94 (1955).

Review

Planning and Control in the Managed Forest, by Hermann Knuchel. Translated by M. L. Anderson. *Journal of Ecology*, 43:653-4 (1955) (E. W. Jones).

ECOLOGY

Original Publications

- The Ecological Study of Buried Soils, by G. W. Dimbleby. *Advancement of Science*, 12:11-16 (1955).
- A Bronze Age Barrow on Turner's Puddle Heath, by G. W. Dimbleby with Stuart Piggott. *Proc. Dorset Natural History Archaeological Society*, 75:34-5 (1955).
- The influence of artificial shading of the ground vegetation on the nutrition and growth of Sitka spruce (*Picea sitchensis* Carr.) on a heathland plantation, by L. Leyton. *Forestry*, 28:1 (1955).
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APPENDIX II

STAFF

I. STAFF ENGAGED IN INSTRUCTION AND RESEARCH

- PROFESSOR H. G. CHAMPION, C.I.E., M.A., D.Sc. (Oxon.). Tropical Forestry, Forest Policy.
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G. H. THOMPSON, B.Sc., M.A. (Oxon.). Forest Zoology, Entomology.
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- E. W. RUSSELL, M.A. (Oxon.), Ph.D. (Cantab.). Soil Science.
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